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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/595,495	04/24/2006	Nicolas Mermod	3024-119	1575

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EXAMINER	
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ART UNIT	PAPER NUMBER
1636	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/595,495	MERMOD ET AL.	
	Examiner	Art Unit	
	CELINE X. QIAN	1636	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 November 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *See Continuation Sheet* is/are pending in the application.

4a) Of the above claim(s) *See Continuation Sheet* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *10-108,111-120 and 122-124* is/are rejected.

7)☒ Claim(s) *72,80,82,90,103,105 and 108* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *24 April 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *1110*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Continuation of Disposition of Claims: Claims pending in the application are 15-17,23,24,26,28,34,42-45,48,49,51,55,62-65,67-72,74-93,95-103,105-120 and 122-124.
Continuation of Disposition of Claims: Claims withdrawn from consideration are 15-17,23,24,26,28,34,42-45,48,49,51,55,62-64,69,80,92,93,95-100,109 and 110.

DETAILED ACTION

Claims 15-17, 23, 24, 26, 28, 34, 42-45, 48, 49, 51, 55, 62-65, 67-72, 74-93, 95-103, 105-120, 122-124 are pending in the application.

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/19/2010 has been entered.

Election/Restrictions

In the response filed on 11/19/2010, Applicants assert that claims directed to SEQ ID NO: 24-27 have been amended to specifying the characteristics of DNA "having a melting temperature of between 55 and 75° and a DNA bending value of 4 radial degrees, wherein said bent DNA element comprises at least five contiguous AT or TA nucleotides and wherein said binding protein is a transcription factor." Applicants assert that the amendment also refer to a TA and AT content of above 33% and the presence of a specific DNA bending values, not present in Michaloski et al. Applicants assert that the restriction requirement be withdrawn in light of the change.

The above request has been considered but deemed unpersuasive. As set forth in the previous office action, the sequences of SEQ ID NO: 24-27 does not share a significant structural elements based on the nucleic acid sequences because 1) they do not have significant sequence similarity; 2) there is no proof that the common structure of 33% TA and or 33% AT on a stretch

of 100 contiguous base pair, and comprise a binding site for DNA binding protein is essential to the common property of enhancing protein production in vitro or in vivo greater than that of chicken lysozyme MAR. Therefore, the restriction requirement is deemed proper and thus maintained.

Accordingly, claims 15-17, 23, 24, 26, 28, 34, 42-45, 48, 49, 51, 55, 62-64, 92, 93, 95-100, 110 are withdrawn from consideration. Claims 65, 67-72, 74-91, 101, 102, 103, 105-109, 111-120, 122-124 are currently under examination.

Specification

Acknowledgment is made of the submission of amendment to the specification. The amendment has been entered and the objection has been withdrawn.

Claim Objections

Claims 69, 72, 80, 82, 90, 103, 105 and 108 are objected to for containing non-elected invention. These claims have been and will be examined to the extend it read on SEQ ID NO: 25. Claim 108 depends on non-elected claim 15.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 65, 67-72, 74-91, 101, 102, 103, 105-109, 111-120, 122-124 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the

application was filed, had possession of the claimed invention. This rejection has been re-written to address the amendment.

The written description requirement is set forth by 35 U.S.C. 112, first paragraph which states that the: "specification shall contain a written description of the invention. . .[emphasis added]." The written description requirement has been well established and characterized in the case law. A specification must convey to one of skill in the art that "as of the filing date sought, [the inventor] was in possession of the invention." See Vas Cath v. Mahurkar 935 F.2d 1555, 1560 19 USPQ2d 1111, 1117 (Fed. Cir. 1991). Applicant may show that he is in "possession" of the invention claimed by describing the invention with all of its claimed limitations "by such descriptive means as words, structures, figures, diagrams, formulas, etc., that fully set forth the claimed invention." See Lockwood v. American Airlines Inc. 107 F.3d 1565, 1572, 41 USPQ2d 1961, 1966 (Fed. Cir. 1997).

In analyzing whether the written description requirement is met, it is first determined whether a representative number of species have been described by their complete structure. Next, it is determined whether a representative number of species have been sufficiently described by other relevant identifying characteristics. Claim 65 recites "a purified and isolated DNA sequence that comprises at least one bent DNA element comprising at least 33% of the TA and/or 33% AT on a stretch of 100 base pairs, and at least one binding site for a DNA binding protein, which has protein production increasing activity greater than that of cLysMAR." The claimed invention encompasses a large genus of nucleic acid sequences of varying length (longer or equal to 100 base pair) which have at least 33% of the TA and/or 33% AT on a stretch of 100 base pairs, regardless whether they possess protein production increasing activity greater than

that of cLysMAR in any setting (in vitro, in vivo, or in transgenic organism). The specification discloses identification of MAR sequences which may increase protein expression in CHO cells through bioinformatics computational algorithms. The specification discloses 4 sequences (1-68, 1-6, 1-42 and X-S29) picked out from such potential MARs which displays protein production increasing activity greater than that of the 5' chicken lysozyme MAR when linked to the expression construct in CHO cells. The specification discloses all these sequences have a high AT/TA value (mean about 35%, see Table 6) and comprises potential transcription factor binding sites. However, the specification does not disclose whether any sequence with 33% TA and/or 33% AT on a stretch of 100 base pairs and any type of DNA binding site would have protein producing increasing activity in any setting (in vitro, in vivo or in transgenic organism).

The information within the prior art at the time of filing does not make up for the deficiency in the specification for describing the structural element that is linked to the claimed function. The specification indeed states in the background section "no clear cut MAR consensus sequence has been found...(page 2, line 37)" and "the identification of MAR by biochemical studies is a long and unpredictable process, various results can be obtained depending on the assay (see page 2, lines 46-47)." With regard to predicting MAR sequence by in silico method, the specification teaches all available tools are limited by factors such as poor specificity, the lack of confirmation of large amount of hypothetical MARs identified by such tool, and thus, many of such tools becomes useless to identify potent genetic elements with regard to efficient increasing recombinant protein production (see page 3, 1st-3rd paragraph). Girod et al., published in 2007 (see IDS), 4 years after the date of filing of the present application, state "only a few MARs have been conclusively identified from an estimated

number of 50,000 or more per genome." Girod et al. further teach that "although the nuclear matrix binding function of MARs is conserved from plants to mammals, their DNA sequence is highly polymorphic, and their activities could not be ascribed to any simple DNA motif. Thus, MAR function has often been related to structural properties rather than to its primary sequence, such as the high DNA strand unwinding and unpairing susceptibility of A+T rich sequences and a high potential for denaturation of the double helix. Whether these features contribute to the transcriptional activity of MARs is yet unknown." Girod et al. then teaches a method of identifying MAR sequences based on the prediction of active MAR sequences have a high potential to accommodate curvature, a deep DNA major groove and a wide minor groove, a weak correlation with DNA melting temperature and the presence of certain transcription factors such as SATB1, NMP4 and homeobox proteins (see page 748, 2nd col., and page 749). Girod et al. disclose that 1,566 sequences from the human genome were identified using above parameter at stringent condition (see page 749, bridging paragraph). Girod et al. disclose that none of the 1,566 sequence can be completely aligned on the mouse genome, and suggesting different primary sequence may contribute to species specificities. Girod et al. further selected several putative MAR sequences based on the basis of their high computed score, location near known ubiquitously expressed genes (to avoid tissue specific activity), and have core elements of various length and/or enriched in various combination of potential transcription factor binding sites (see page 749, last paragraph of col.2). Girod et al. disclose that 6 out 7 such sequences increased expression of a reporter in stably transfected polyclonal CHO cells substantially. Girod et al. disclose that one of the non-activator, 1-15, does not exhibit obvious difference between active and inactive sequences, wherein it also has highly enriched AT and TA

dinucleotides (70%), and no qualitative or quantitative difference between core sequences of functional and inactive sequences. Girod et al. assert that the mere presence of an (A+T) rich core elements does not suffice to activate gene expression, and the lack of activity may result from the lack of tissue specific activities in CHO and/or from the requirement of additional DNA features (page 750, 2nd col., 2nd paragraph). Girod et al. suggest that gene activation by MARs may rely on the positioning of a nucleosome in the vicinity of transcription factor binding sites, whereas DNA curvature motif alone is not sufficient for transcriptional activity (see page 752, 1st col., 1st paragraph). Girod et al. acknowledges that MARs display a bewildering array of activities that have been difficult to ascribe to any specific DNA motif (see page 751, 2nd col., 1st sentence of last paragraph).

In view of the teaching in the prior art, it appears that there is no consensus agreement that any of the specific DNA motif may be ascribe to various activities of MARs, especially the protein expression enhancing activity. As such, whether a DNA sequence comprising one bent element comprising at least 33% of the dinucleotide TA an/or at least 33% of the dinucleotide AT on a stretch of 100 contiguous base pairs; and at least one binding site for any type of DNA binding protein can increase protein production is unpredictable. The specification discloses only 4 (4 out of more than one thousand that selected by the computer program) nucleic acids that have the recited structural and can increase protein production in CHO cells greater than that of cLysMAR, it thus fails to describe a representative of species of nucleic acids having the structural properties comprising at least 33% of the dinucleotide TA an/or at least 33% of the dinucleotide AT on a stretch of 100 contiguous base pairs; and at least one binding site for any type of DNA binding protein that can have the functional property of increasing protein

production in any system than that of cLysMAR. Moreover, the specification fails to describe other identifying characteristic of the claimed genus of nucleic acids that has the recited structure and function. In other words, the specification fails to describe a nexus between the claimed structure and the function of increasing protein production in any system than that of cLysMAR. Nucleic acids that of various lengths (larger or equal than 100 base pair) comprise 33% of the dinucleotide TA an/or at least 33% of the dinucleotide AT on a stretch of 100 contiguous base pairs may have the property of being a curved DNA and/or bind matrix protein (DNA binding protein is not limited to transcription factors, but applies to matrix binding protein as well), whether they have the function of increase protein expression in vitro (in cell free system) or in vivo or more than that of cLysMAR is unpredictable because the specification fails to establish such a nexus. Similarly, although the art recognizes that the MARs having transcription activity generally has a wider minor groove and deeper major groove and a low melting temperature, the exact value for such parameters possessed by a nucleic acid molecule that has protein increasing activity greater than that of cLysMAR is not precisely determined even years after the application is filed. The application also fails to describe such parameter for the claimed genus of nucleic acids that alleged have protein production increasing activity greater than that of cLysMAR. Since the specifications fails to establish a structural and functional relationship, and the prior art does not make up such deficiency, the skilled artisan would not be able to envision the common structure of the claimed nucleic acid required for its function. Therefore, the claimed DNA is not sufficiently described by the instant specification. With regard to variants or fragments of SEQ ID NO: 25, having a melting temperature of between 55 and 75° and a DNA bending value of 4 radial degrees, wherein said bent DNA element comprises at least five

contiguous AT or TA nucleotides and wherein said binding protein is a transcription factor, it is not sufficiently described because the specification does not describe which fragment, and or what type of variant of this DNA molecule have the protein producing increasing activity. The specification also fails to establish that which fragment or what type of variant would correlate to a sequence having melting temperature of between 55 and 75° and a DNA bending value of 4 radial degrees, wherein said bent DNA element comprises at least five contiguous AT or TA nucleotides and wherein said binding protein is a transcription factor, and such variant would possess the protein producing enhancement activity. With regard to claim 124, nucleic acid sequences having 70% homology with SEQ ID NO: 25 are not sufficiently described because the specification fails to ascribe the protein production enhancing activity to any portion or variant of SEQ ID NO: 25. As such, whether sequences having 70% homology with SEQ ID NO: 5 have the claimed function is unpredictable. Lastly, since the claimed DNA is not sufficiently described, the vector and host cell comprise said DNA also lack description for same reason as set above. Thus, the specification fails to describe the invention in such a way to convey a skilled artisan that the inventors had possession of the invention at the time the application was filed.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 85-90, 106, 107, 119 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 85, the recitation of "A transfected host cell comprising at least one purified and isolated DNA sequence" renders the claim indefinite because it is unclear what the host cell is transfected with. If the host cell is transfected with the DNA sequence of claim 65, then the DNA sequence is no longer "purified or isolated" because it is inside the host cell. Claims 86-90 and 119 are rejected for same reason because they depend on claim 85.

Regarding claim 106, the recitation of "The synthetic MAR sequence" lack antecedent basis. It would be remedial to change the recitation to "A synthetic MAR sequence." Claim 107 is rejected for same reason because they depend on claim 106.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 65, 67, 68, 70, 71, 91, 111-113 and 123 are rejected under 35 U.S.C. 102(b) as being anticipated by the sequence having accession number AL389920.

The sequence having accession number AL389920 comprises bend DNA element comprising at least 33% of the TA and/or AT dinucleotide on a stretch of 100bp, and it comprises at least one binding site for a DNA binding protein (see for example, stretch from bp 89202-89302, which comprises more than 33% or TA dinucleotide). DNA binding protein such as SATB1 and NMP4 are known to bind polydA and polydT sequences. As such, the sequence having accession number AL389920 has many such potential binding sites. The melting

temperature of a DNA molecule depends on the AT and GC content. Since the sequence from the prior art meets the limitation of the claim, it is inherent that the melting temperature also meets the claimed limitation. Therefore, this sequence anticipates the claimed invention.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CELINE X. QIAN whose telephone number is (571)272-0777. The examiner can normally be reached on 10-6:30 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joanne Hama can be reached on 571-272-2911. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Celine X Qian /
Primary Examiner, Art Unit 1636